Driving Report System Requirements Specifications

July 2019

Hawaii Road Usage Charge Demonstration

with

D'ARTAGNAN
CONSULTING

Contents

Figures

Definitions & Abbreviations

TERM/ABBREVIATION	DEFINITION/DESCRIPTION	REMARKS
AES	Advanced Encryption Standard	
Component	A subsystem component is a modular part of the subsystem that serves specific activities or tasks	
ConOps	Concept of Operations	
Datawarehouse	The database developed for the Part 1 Demonstration but also used for Part 2 to store Participant travel data used to generate Road Usage Reports.	
Demonstration Project	The terms refer to the HiRUC Demonstration, including both parts 1 and 2	
DC	Data Collection	
DIT	Honolulu City & County Department of Information Technology	
DR	Driving Report, a printed statement of driving data sent to registered vehicle owner by the HiRUC Administration	
DRG	Driving Report Generator, the component of the HiRUC system (developed for the Part 1 Demonstration but also used in the Part 2 Demonstration) that creates Driving Reports based on travel data stored in the Datawarehouse.	
EPA	Environmental Protection Agency	
Function	Specific tasks accomplished by a system component	
Functional group	Functional groups are high-level objectives of the subsystem component	
HDOT	Hawaii Department of Transportation	
HiRUC Administration	Name given to the administrative entity tasked with recruiting Demonstration Participants, verifying the correct computation of road usage charges, and performing any compliance activities recommended by HDOT.	
HiRUC System	The system established for the Part 1 demonstration to generate Driving Reports (DRs), comprising a Datawarehouse and a DR Generator. It will also be used in Part 2.	
HTTP	HyperText Transfer Protocol	
ICD	Interface Control Document	
IP	Internet Protocol	
IT	Information Technology	
Part 1	The Manual Demonstration, in which Hawaii residents receive a Driving Report based on their odometer readings collected during safety inspections. Not included in this specification.	
Part 2	The Automated Demonstration, in which ~2,000 Participants receive Road Usage Reports over the 9-month	

TERM/ABBREVIATION	DEFINITION/DESCRIPTION	REMARKS
	Demonstration based on a variety of Mileage Reporting Methods. Included in this specification	
Participant	A volunteer who has enrolled in the Part 2 (Automated) Demonstration	
PII	Personally Identifiable Information	Defined in business rules
PMVI	Periodic Motor Vehicle Inspection	
RUC	Road Usage Charge	
SRS	System Requirement Specification	
TCP	Transmission Control Protocol	
UBI	Usage-based Insurance	
VIN	Vehicle Identification Number, a unique serial number for each vehicle, standardized as a 17-digit alphanumeric code since 1981.	
VMT	Vehicle Miles Travelled	

1. Preface

1.1. Project Documents

The functional and technical requirements of vendor systems that support Part 1 of the Hawaii Road Usage Charge Demonstration are included in this document. Other documentation relating to Part 1 of the HiRUC Demonstration includes the following:

► The *Part 1 Concept of Operations*, which provides a high level overview of the road usage charge collection usage scenarios covered in the project.

► *The Part 1 Business Rules Document (BRD)* provides business operations rules/requirements, thus complementing this document, the System Requirements Document. The BRD outlines specific directives that have to be followed to process these system inputs into outputs for end users and the HiRUC Administration.

► *The Part 1 Interface Control Document (ICD),* which provides detailed specifications for all interfaces between subsystems.

1.2. Document Contents

In the remaining chapters of this document, descriptive introductory sections precede the statement of requirements. These descriptions are provided to help the reader understand and contextualize the requirements. They do not constitute requirements themselves. In case of any conflict between this language and the written requirements, the requirements always take precedence. All requirements are included in sections 3 to 5. The remainder of this document is organized as follows:

Section 2 System Purpose covers the goals and objectives of the HiRUC system and introduces the high-level system architecture

Section 3 System Level Requirements includes general requirements that apply to all subsystems.

Section 4 Datawarehouse subsystem includes all requirements that apply to the Datawarehouse subsystem, the subsystem centralizing and consolidating the data from all external data sources. This subsystem interfaces directly with the Periodic Motor Vehicle Inspection (PMVI) and City and County of Honolulu's Department of Information Technology's (DIT) Vehicle Registry external systems.

Section 5 Driving Report Generator (DRG) subsystem includes all the requirements that apply to the DRG subsystem, the subsystem that builds Driving Reports for all **enrolled** vehicles - for the purposes of the manual phase of the HiRUC Demonstration, any vehicle eligible to receive a Driving Report (per the business rules) is considered *enrolled* for the HiRUC Demonstration). The subsystem interfaces with the Datawarehouse subsystem and the external printing and mailing system.

1.3.   Requirement Classification and Naming Conventions

1.3.1.   Classification of Requirements

Every subsystem requirement is classified at three levels: subsystem component, functional group, and function. A subsystem component is a modular part of the subsystem that serves specific activities or tasks. Functional groups are high-level objectives of the subsystem component. Each functional group comprises a set of functions that are specific tasks accomplished by the component. These functions are further broken down into requirements.

The Figure 1 below traces the classification of a requirement DL.IRD.1 through each of the 3 levels of classification; component, functional group and function.

Figure 1: Classification Levels of Subsystem Requirements
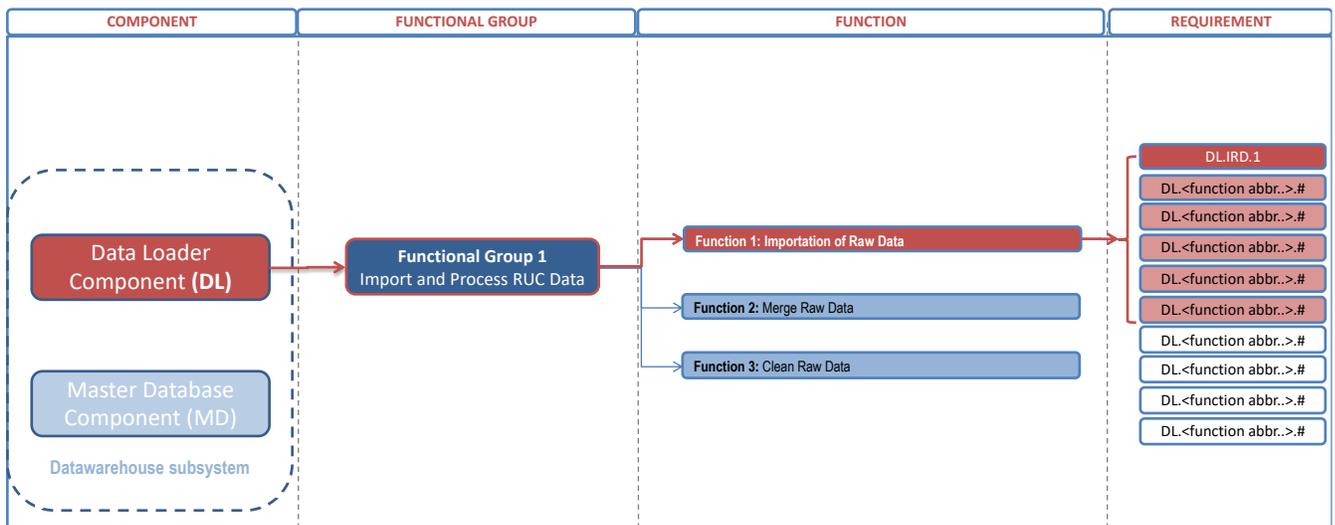
1.3.2.   Naming conventions

Each detailed requirement is named according to the following form:

<component abbreviation>.<function abbreviation>.<requirement index>

The detailed requirements are grouped by functions. In the following document, functions are abbreviated using the three capitalized letters in the function name. For example, the first function of the Data Loader component (DL) is "Importation of Raw Data." The abbreviation of the function is thus IRD, and the requirements for this Data Loader function are coded: **DL.IRD.#, where # is the requirement index**

2.   The HiRUC Demonstration Project

2.1.   Organization of HiRUC Demonstration

The HiRUC Demonstration comprises two parts - the Manual Demonstration and Automated Demonstration. The Manual Demonstration (referred to as **Part 1**) will be launched before the Automated Demonstration (referred to as **Part 2**).

The key distinctions between parts 1 and 2 are the following:

► Part 1, Manual Demonstration, includes all registered passenger vehicles in the state of Hawaii for which mileage data is reported during annual safety inspection visits while Part 2 only includes participants who volunteer to be in the HiRUC Automated Demonstration.

► Part 2, Automated Demonstration, includes a Service Provider that will enroll participants and their vehicle(s), provide mileage reporting technologies, manage participant RUC accounts and distribute Road Usage Reports on behalf of the state.

This document addresses Part 1. Part 1 operations will last 12 months and will involve registered passenger vehicles in the state of Hawaii. Part 1 will leverage existing DIT and PMVI processes to collect vehicle and mileage data to issue simulated Driving Reports for registered passenger vehicles

Part 1 and Part 2 are anticipated to run concurrently for several months, which means both parts need to be coordinated to ensure a consistent experience for all participants.

2.2.   Goals and Objectives of the HiRUC Demonstration

► The HiRUC Demonstration has the following overarching goals that apply to both parts of the demonstration:

> Help vehicle owners visualize how a road usage charge would work

> Promote understanding and level of comfort with RUC

> Determine level of public acceptance of the RUC concept once it is demonstrated in Hawaii

> Examine the revenue potential and benefits of the new RUC system compared with gas tax revenues

> Identify and enable policy analysis (public acceptance and financial).

► The objectives of Part 1 are specifically to:

> Demonstrate how existing PMVI and City & County of Honolulu Department of Information Technology (DIT) systems and processes can be leveraged to support RUC

> Evaluate the technical and operational feasibility, and viability of a RUC system that leverages existing PMVI and DIT capabilities

> Understand the marginal costs associated with the RUC system

> Demonstrate ability to handle data securely and protect privacy of vehicle owners

> Understand operational aspects of a RUC system; identify corresponding issues and provide a quantitative base for recommendations

> Demonstrate transparency/auditability of the system

3. System for Part 1

3.1. General Purpose and Scope of the HiRUC System

Part 1 of the HiRUC Demonstration will implement a cost-effective and open system for collecting the road usage charge, one that leverages the Hawaii Department of Transportation's (HDOT) existing capabilities, is open to future private service and technology providers and thus provides user choice in the long run, is easy to use and understand, and provides clear audit trails.

The system developed for the Hawaii Road Usage Charge Demonstration is intended to have many of the features, functions and processes of a potential future revenue generating road usage charging system. However, some attributes of the final system will not be designed into this HiRUC system. This is because the focus of the HiRUC Demonstration will be on issuing Driving Reports, the account management that will be introduced in the second part of the HiRUC Demonstration, and administrative activities involving collection, monitoring, and analysis of HiRUC data.

Payment collection and enforcement activities are excluded from the scope. Compliance and administrative activities in the HiRUC Demonstration will be reduced and simplified from the way that they would be implemented in an actual revenue-collecting charge system, resulting in the exclusion of activities such as charge recovery, appeals management, IT assets management[1], human resources management, change management, and planning and controls management.

The main purpose of the HiRUC system is to support the goals and objectives of the HiRUC Demonstration outlined hereafter.

3.2. HiRUC Part 1 Demonstration Context Diagram

► The HiRUC Demonstration context diagram for Part 1 shown in Figure 2 below illustrates high-level interactions between key stakeholders and major system components.

► **Vehicle owners** are individual or fleet owners who have registered their vehicles with a DMV in their county of residence. Vehicle owners drive their vehicles on the **road network** consisting of public, private, and (possibly) out-of-state roads. Registered owners will receive a single **Driving Report** by mail from the **HiRUC Administration** for each vehicle that will show what road usage charge could be based on odometer readings collected at the **PMVI inspection stations**. They will not be required to pay any road usage charge as no notion of payment will be introduced in the HiRUC Demonstration.

► **The City and County of Honolulu Department of Information Technology (DIT)** has a long-standing agreement with the State of Hawaii to provide IT services related to the maintenance of the State's motor vehicle registry. DIT centralizes all vehicle registration information from the county Departments of Motor Vehicles (DMVs). It provides up-to-date vehicle registration data – registered owner addresses and vehicle data – to the HiRUC System.

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[1] Except those directly related to active HiRUC systems.

Figure 2: Demonstration Context Diagram
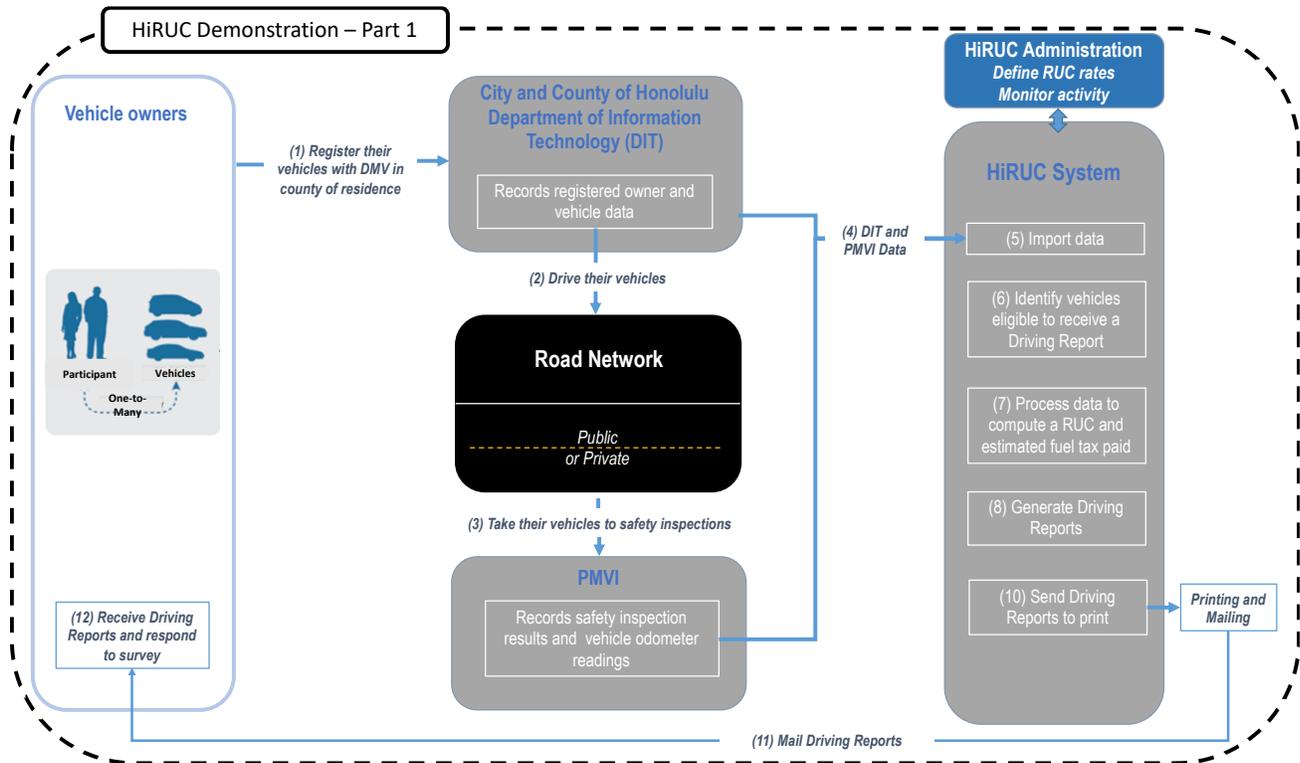
► **PMVI Inspection stations** are operated by private entities that are contracted by HDOT to conduct mandatory safety inspections on vehicles. Vehicle owners have to take their vehicles to an annual safety check at the PMVI Inspection stations – owners of new vehicles take their vehicles to a first safety inspection two years after purchase and then proceed to annual safety inspections. The PMVI Inspection stations are connected to a centralized PMVI system that collects odometer readings in addition to safety inspection results. The PMVI system provides inspection results and odometer readings for each vehicle inspected to the HiRUC System.

► **HiRUC System** is a system developed by a private entity contracted by the HiRUC Administration. It collects data on registered owners and their vehicles from the DIT system, and odometer readings and inspection results from the PMVI system, and uses this data to issue Driving Reports. The HiRUC system:

1. Identities vehicles that are eligible to receive Driving Reports,

2. processes the road usage data collected to compute a road usage charge and estimated gas tax for each eligible vehicle,

3. generates Driving reports based on road usage data and estimated gas tax data,

4. stores Driving reports that are accessed by an external printing and mailing system to be printed and sent by mail to the registered address of vehicle owners, and

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5. reports data to the HiRUC Administration (D'Artagnan).

► **Printing and Mailing** is an external system that prints and sends Driving Reports generated by the HiRUC system to the registered Vehicle owners' address by mail.

► **HiRUC Administration** refers to the team that manages and administers the HiRUC Demonstration (D'Artagnan), as well as the HiRUC system (central system developed to support both Part 1 and Part 2) on behalf of HDOT. It provides administrative and operational support to the HiRUC Demonstration. The HiRUC Administration would thus perform some of the government functions required in a full-scale RUC operation and have oversight over the vendor that supports the HiRUC System.

3.3. HiRUC Part 1 System Objectives

The system described in this document provides the technology to support the goals and objectives of the Hawaii Road Usage Charge Demonstration. Thus, the HiRUC system in Part 1 shall specifically:

► Demonstrate technical and operational feasibility of RUC by:

► Incorporating vehicle and mileage data from operational state of Hawaii IT systems (DIT's Vehicle Registry and HDOT's PMVI system)

► Identifying and consolidating vehicle and mileage data per registered vehicle

► Computing fuel tax and road usage charges according to policy orientations

► Generating Driving Reports for batches of vehicles on a periodic basis

► Identifying registered vehicle owners and mailing addresses to send Driving Reports

► Promoting understanding and comfort with RUC by:

► Supporting simple, cohesive and seamless end-user processes

► Supporting consistent communications with end users

► Conforming to data privacy and security policy guidelines

► Supporting customer service

► Encouraging engagement and eliciting feedback from registered vehicles owners receiving a Driving Report by:

► Providing support through the Help Desk

► Fielding surveys

► Identifying and enabling policy analysis of both financial and public acceptance topics by:

► Collecting data on the public's level of RUC understanding and acceptance through surveys

► Collecting and consolidating fuel tax and mileage consumption data

► Reconciling HiRUC Demonstration data to identify inconsistencies

► Analyzing and reporting on HiRUC Demonstration data

3.4. HiRUC Subsystems

3.4.1. Subsystems

► This document contains the overall requirements for the Road Usage Charge system, and the specific subsystem requirements for the Datawarehouse subsystem, and the Driving Report subsystem, the two subsystems that comprise the RUC system for Part 1, see Figure 3.

Figure 3: The Two Subsystems for Part 1
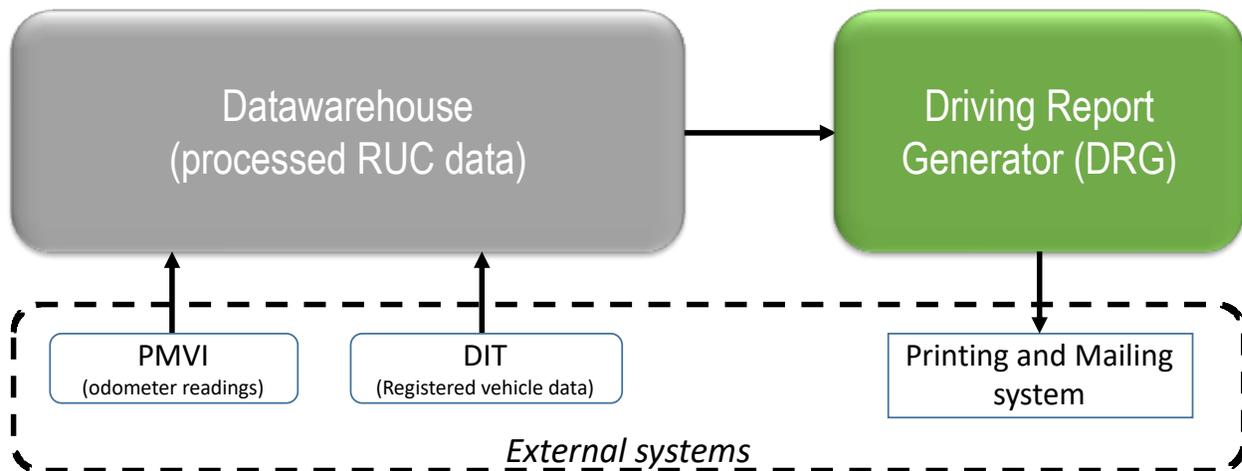
► The document presents the full system requirements, followed by the requirements for each of the subsystems.

► This version of the SRS is intended to provide comprehensive requirements for the overall Road Usage Charge System by defining the requirements for each of its subsystems.

► The Hawaii Road Usage Charge system includes:

► a **Datawarehouse subsystem** that imports, merges, processes, and stores raw data from the DIT Vehicle Registry and the PMVI database, determines vehicle eligibility to receive a Driving Report, and prepares and transmits Driving Report data for eligible vehicles to the DRG subsystem. The subsystem comprises two components – a Data Loader component and a Master Database component.

► a **Driving Report Generator (DRG) subsystem** that receives processed transactional data from the Datawarehouse subsystem, applies business rules to the data and builds Driving Reports according to the appropriate layout, and stores Driving Reports accessed by the external printing and mailing system. Once Driving Reports are issued, the subsystem reports the Driving Report status per vehicle to the Datawarehouse subsystem. The Driving Report subsystem comprises four components – the Data Processor, the Driving Report Builder, the Driving Report Repository, and Reporting.

3.4.2. General System Architecture

Figure 4 shows the general HiRUC system architecture based on the subsystems and components described above.

Figure 4: General System Architecture for Part 1
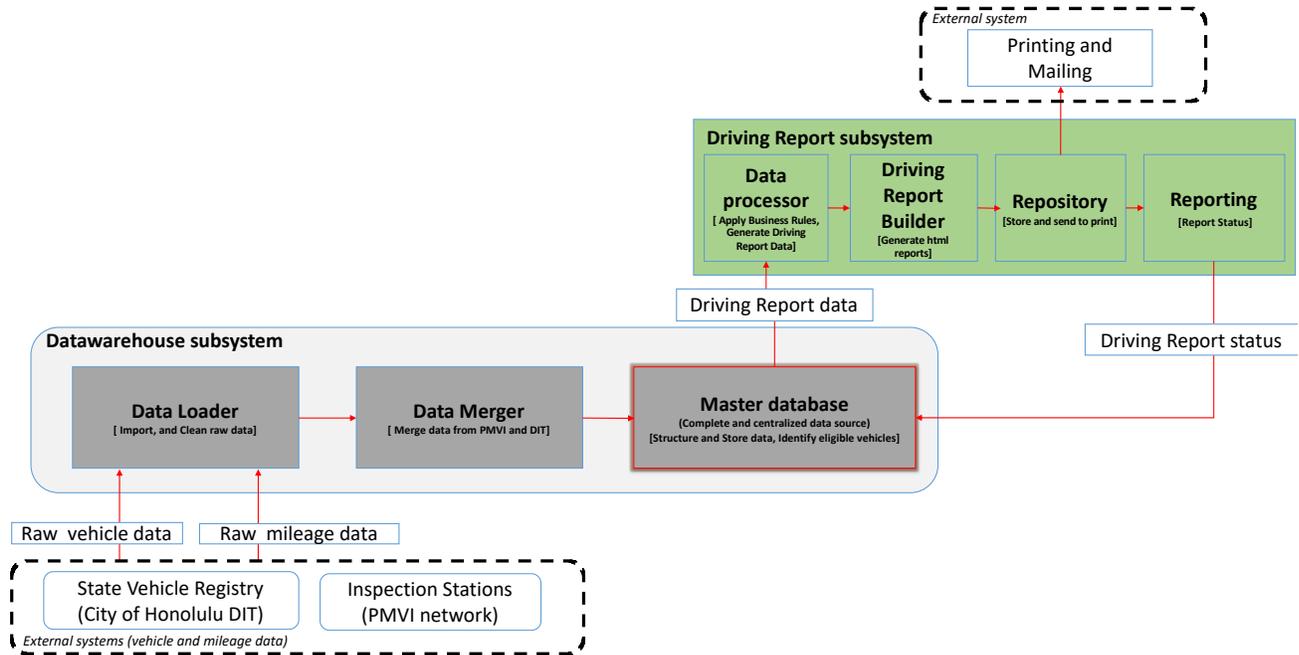
► Functions Supported by Subsystems

Figure 5 shows the different functions supported by the Datawarehouse and Driving Report Generator subsystems.

Figure 5: Functions Supported by the Subsystems

		Datawarehouse	**Driving Report Generator**
Functional Groups	**Import, Clean and Structure Raw Data**	✓ Import Raw Data ✓ Clean Raw Data ✓ Merge Raw Data ✓ Store VIN and RUC Data ✓ Identify eligible VINs	
	Process Raw Data into Road Usage Charge	✓ Process VIN and Road Usage Charge Data (Prepare for Driving Report generation)	✓ Apply business rules to processed RUC data ✓ Build Driving Reports ✓ Store Driving Reports (make accessible for print) ✓ Report Driving Report status to Datawarehouse
	Data Analysis	✓ Report Road Usage Data to HiRUC Admin ✓ Consolidate Data ✓ Reconcile Data ✓ Generate Data Analysis Reports	

4. Business Requirements

All the bold terms are defined in the Business Rules Document. Please refer to that document for precise definitions.

In Part 1, the HiRUC system shall issue Driving Reports for passenger vehicles registered in the state of Hawaii.

1. The HiRUC system shall firstly allow HDOT to calculate a per-mile road user charge for registered passenger vehicles in the state of Hawaii, and secondly issue and send a Driving Report to the registered owner of the vehicle.

► The system shall identify every **registered passenger vehicle** in the state and determine whether a particular vehicle is subject to RUC. The system shall identify the registered passenger vehicle's owner and the owner's corresponding mailing address. The system shall determine the **vehicle's eligibility** to receive a HiRUC Driving Report based on available vehicle data, vehicle owner data, and odometer readings reported through vehicle inspection data. If an eligible vehicle is subject to RUC, the system should identify when its two most **recent valid** (inspection passed) **odometer readings** were, what those odometer reading values were, and if and when a HiRUC Driving Report was issued for the vehicle. Based the validity of information identified, the system shall issue and send a printed Driving Report by mail to the registered passenger vehicle owner.

► The system shall identify three registered owner **segments**:

  1. individual electric vehicle owners **("Electric segment"),**

  2. individual non-electric vehicle owners **("Non-electric segment"),** and

  3. fleet owners ("Fleet segment").

► These segments are defined in the Business Rules Document. Each segment will have a different Driving Report layout. One Driving Report per vehicle shall be issued for each individual vehicle owner (either electric or non-electric). Fleet owners may receive a single Driving Report containing charges for all their registered vehicles or may receive periodic Driving Reports (with each covering a portion of their fleet) depending on the proportion of fleet vehicles inspected during a given period.

  1. The HiRUC system shall support automatic reasonableness and eligibility checks on mileage data and thus odometer readings that will be used for Driving Reports. In particular, recorded mileage of less than zero miles per day, or greater than 1500 miles per day, shall be considered unreasonable and the mileage record marked for investigation.

  2. The HiRUC system shall allow the HiRUC Administration team to monitor the Driving Report data. The HiRUC system shall periodically report the list of Driving Reports issued for all passenger vehicles during the period to the HiRUC Administration.

5. General System Level Requirements

5.1. System Security, Disaster Recovery, and Data Retention

Note that the any subcontractors or third-party vendors involved in provision of subsystems are referred to as "vendor" in this section.

System security shall comply with the general IT industry standards as described below. As part of this, the system design and an inventory of information security controls are required of all vendors before operation of the HiRUC system, during security verification checks. Vendors shall implement security and disaster recovery details for the overall system to ensure adequate protection and assurance of recovery options in the event of an unexpected incident.

Vendors shall maintain a System Security Plan comprised of the following documents:

► System architecture diagram illustrating the location of key security measures (mentioned in SYS.SSD.1)

► Written assessment of their organization and system security, including a list of what PII is stored and where it is stored (mentioned in SYS.SSD.2 and SYS.SSD.3)

► Security policy (mentioned in SYS.SSD.5)

► Documentation of Access Control (mentioned in SYS.SSD.7)

► Business continuity plan (mentioned in SYS.SSD.22)

These documents shall be reviewed and updated as necessary in the event of a system breach or detection of potential security threats.

General Security Requirements:

SYS.SSD.1   The vendor shall provide a system architecture diagram that illustrates the location and key security measures proposed for the Road Usage Charge Pilot system.

SYS.SSD.2   The vendor shall provide a written assessment of the security of their organization and systems based on the security requirements below (SYS.SSD.7 to SYS.SSD.24).

SYS.SSD.3   The security assessment documentation shall list what PII is stored and the corresponding system and operational controls to maintain the appropriate level of security and access. PII is defined in the Business Rules.

SYS.SSD.4   During system operation, the vendor shall make the HiRUC Administration aware of any system breach, or potentially significant informational breach immediately upon discovery via e-mail and telephone call.

SYS.SSD.5   Vendors shall document and operate a Security Policy during the Part 1 Demonstration. The security policy shall cover the vendor's security organization chart, governance

structure, key security procedures, risk management policies, and monitoring of controls relevant to the security of the system.

SYS.SSD.6   Vendors shall initiate change control processes when deficiencies in the design or operating effectiveness of security controls are identified during system operations and monitoring.

System Level Security Requirements:

To ensure the proper level of security within the systems, the following requirements detail the policies required of all Part 1 vendors:

SYS.SSD.7   Access control: The vendor shall provide and document access control on all systems employed in Part 1 Demonstration delivery and operations. This includes, but is not limited to:

► Account management – user account creation/termination
► User role management
► Access control logs
► System administrator / Administrative controls
► Physical sites housing the Service Provider's servers

SYS.SSD.8   Access control related to password security and logging: The vendor shall support and document authentication and access control as it relates to password security and logging of access to its systems. This shall include but not be limited to password encryption, logging of access attempts (granted and denied), and administrative access to log files. Passwords shall have a minimum of 8-character length, include letters and numbers and one capital letter, and require periodic password change.

SYS.SSD.9   Access to Personal Identifiable Information (PII): The vendor shall support User Roles with varied access to Personally Identifiable Information (PII). The vendor shall provide a description of all authentication methods and user roles used for systems that will contain personally identifiable information. For the HiRUC Demonstration, employ user roles with limited rights to PII access. The vendor shall provide at least the user role of a customer service representative. The roles of Enforcement and Accountant/Auditor would be relevant to a potential future operational system but need not be included in the HiRUC Demonstration.

SYS.SSD.10   Antivirus and anti-malware: The vendor shall provide up-to-date antivirus and anti-malware software on all systems. This vendor shall document the way antivirus and anti-malware applies to all applications being used; virus and malware scan and scope frequencies; and the vendor's the incident response process.

SYS.SSD.11   Desktop and portable device security: The vendor shall provide desktop security for all desktop and portable device systems used by vendor staff and subcontractors. This includes but is not limited to firewalls where needed; mandatory password protection; a documented software

update process; and storage encryption with at least 128-bit Advanced Encryption Standard (AES) on portable computing devices used to store State-owned data.

SYS.SSD.12   Server management: The vendor shall provide secure server management. This includes but is not limited to firewalls, at least 128-bit AES encryption on server storage used to store State-owned data or PII, and system Administrator processes such as enabling or disabling (replacing) servers.

SYS.SSD.13   Backup management: The vendor shall provide backup management. This includes but is not limited to system restoration, testing of the system restoration processes, access to back up information, encryption with at least 128-bit AES, and provision and management of back up media.

SYS.SSD.14   Network security: The vendor shall provide network security. This shall include but not be limited to firewalls where needed, public/private network separation, and encryption with at least 128-bit AES.

SYS.SSD.15   Intrusion detection: The vendor shall provide Intrusion Detection and response. This shall include but not be limited to intrusion detection, including all internal monitoring practices; and incident response.

SYS.SSD.16   Encryption: The vendor shall provide Encryption for all PII and road charging data, both in server storage and transmittal. The vendor shall provide their policy for encryption for each level where road charging data will reside (file, database, disk, etc.). This policy shall include all procedures/measures for preventing unauthorized access. The vendor shall use at least 128-bit Advanced Encryption Standard (AES).

SYS.SSD.17   System lifecycle management: The vendor shall provide IT system lifecycle management. This policy shall include but not be limited to the change control process (authorization through implementation), the security patch process, and ongoing maintenance of updates. Lifecycle management activities shall occur throughout the system development lifecycle including design, acquisition, implementation, configuration, testing, maintenance, and replacement of system components.

SYS.SSD.18   Remote access: If a vendor provides remote access to their systems, the remote access shall be secure. This requires security for remote access to road charging data, authentication method(s), encryption used, mobile device policy and security measures.

SYS.SSD.19   Wireless management: The vendor shall provide security for wireless access to their network, if such access is offered. This shall cover the specific uses of wireless access to road charging data, encryption used (specified at least 128-bit AES), guest/non-guest access levels, and incident response. Also, indicate if the vendor uses industry supported access standards 802.11, which standard is being employed. (i.e. 802.11a, 802.11b, 802.11e, 802.11g, 802.11i, 802.11n).

SYS.SSD.20   Not relevant for Part 1.

SYS.SSD.21   The vendor shall provide a plan which details its process for disaster recovery should there be an incident that threatens or impacts normal business operations while contracted for the HiRUC Demonstration.

SYS.SSD.22   The vendor shall provide a Business Continuity Plan which details how essential business functions continue to operate during and after an incident. The plan shall be updated to reflect organizational or system changes.

SYS.SSD.23   The vendor shall provide Data Masking to conceal relevant personal registered owner data from unauthorized access.

SYS.SSD.24   Not relevant for Part 1.

5.2.   Separation of Production and Test Environments

Function 1: Have a Test Environment

SYS.HTE.1   All subsystems and components should be fully tested in a test environment prior to implementation in a live environment. New software and hardware features shall be tested on the test environment before being added to the production environment. Only fully validated subsystems and components are allowed to operate and exchange transactions in the production environment.

SYS.HTE.2   Test data or transactions generated and collected in the test environment must be identifiable as such. The database structure of the production and test databases should be identical to allow for same system inputs and outputs as would be experienced in the production environment to validate subsystems and components. Unless the test and production environments are completely segregated (i.e. no interactions between the two environments), the test transaction record has to be encoded such that it can clearly be identified as a test record. Test records shall not be migrated to the production environment.

SYS.HTE.3   Not relevant for Part 1.

SYS.HTE.4   Not relevant for Part 1.

SYS.HTE.5   The Datawarehouse subsystem, and the DRG subsystem shall each have a separate test environment in addition to a production environment to allow for dry-runs and DRG reviews. Dry-run Driving Reports shall contain the exact information that will be included in the final Driving Reports that will be distributed to the registered owners.

SYS.HTE.6.   The Datawarehouse subsystem shall transmit a sample set of data to the DRG subsystem prior to each formal DR cycle. The purpose of this is to allow the Printing and Mailing system to create a small set of draft printed DRs for review and validation by the HiRUC Administration.

SYS.HTE.7. No DRs related to sample runs (test runs or dry runs) shall be mailed to registered vehicle owners. DR data relating to sample runs shall not be accessible to the registered vehicle owner in any way before they are checked and validated by the HiRUC Administration.

5.3. Critical System Performance Requirements

The performance requirements listed in this section are those that identify critical areas of system performance on the various subsystems. **These requirements are repeated in context with their related components in the following sections. For any discrepancy, the definitions in the following sections take precedence—these values are included for ease of reference only.** Critical performance requirements include the following:

Availability

DW.SAV.1 The Datawarehouse subsystem shall have high availability (99.9% uptime).

DRG.SAV.1 The Driving Report Generator subsystem shall have high availability (99.9% uptime).

Accuracy

MD.CRU.1 The Master database component shall accurately calculate road usage charges based on odometer readings available and applicable state and county RUC rates and gas tax rates for all segments of registered owners (individual electric vehicle owners, individual non-electric vehicle owners, and fleet vehicle owners).

Data Integrity and Consistency

DW.DIC.1 Data shall be cleaned and merged according to business rules.

DRG.DIC.2 Each Driving Report generated shall contain data that only belongs to the current registered owner of the vehicle for which the Driving Report is issued. No data for the previous registered owner(s) shall be displayed on the Driving Report.

6. Datawarehouse Subsystem Requirements

6.1. Subsystem Context

► The Datawarehouse subsystem is the central component of Road Usage Charge System. Its main purpose is to centralize and manage RUC data for Driving Report generation and reporting purposes. It imports, merges and cleans raw data from PMVI and Vehicle Registry, structures and stores the clean merged data and prepares it for Driving Reports.

6.2. Subsystem Purpose

► The purpose of the Datawarehouse subsystem is to:

► Import and clean data from two external sources, the PMVI database and the DIT Vehicle Registry

► Merge data from the two sources based on unique identifiers

► Clean the merged data by **archiving** incomplete or inconsistent sets of data

► Consolidate and store merged and cleaned data from PMVI and Vehicle Registry sources,

► Identify vehicles from merged PMVI and Vehicle registry dataset that are eligible to receive Driving Reports by eliminating edge cases and irrelevant cases

► Identify VINs that have enrolled to receive Part 2 Road Usage Reports (these VINs are not eligible to receive Part 1 Driving Reports)

► Send vehicle and mileage data to the DRG subsystem

► Send vehicle and mileage data to the HiRUC Administration

6.3. Subsystem Overview

This section presents an overview of the Datawarehouse subsystem, which is composed of two components:

► a **Data Loader component** which is designed to import raw data from the DIT Vehicle Registry and the PMVI database using two methods – a one-time mass importation of data to initialize the Datawarehouse with VINs and corresponding initial odometer readings (that are matched between VINs from Vehicle Registry database and the PMVI database), and periodic importations of data to obtain updates of odometer readings for imported VINs and verify continuity of vehicle ownership.

► a **Data Merger component** that merges the raw clean data imported from the PMVI and DIT sources based on the VIN, which is used as the identifier, to obtain a complete set of data. The cleaned and merged data is then transmitted to the Master database component where it is structured and stored in a relational database.

► a **Master Database component** that determines vehicle eligibility to receive a Driving Report according to established business rules, and transmits the list of eligible vehicles to the Data Processor component of the DRG subsystem.

► The Datawarehouse has interfaces with the DRG subsystem as illustrated by the system architecture diagram in Figure 4 above.

6.4. Subsystem Requirements

The requirements presented below are organized according to the functional architecture of the Datawarehouse subsystem. Each requirement is classified according to three levels: subsystem component, functional group, and function as described in Figure 1.

6.4.1. Subsystem Security

The system requirements that cover protection of personal identifiable information (PII), security, backup and recovery shall also cover specific details for this subsystem.

6.5. Datawarehouse Subsystem Specifications

6.5.1. Subsystem Functional Groups

Figure 6 shows the breakdown of the data warehousing subsystem into four key functions. The requirements underlying each of the four functions is described in detail in the following section.

Figure 6: Functions supported by the Datawarehouse Subsystem

Datawarehouse Subsystem

Import, Clean Raw Data	Merge Raw Data	Structure and Store Data	Support Data Analysis
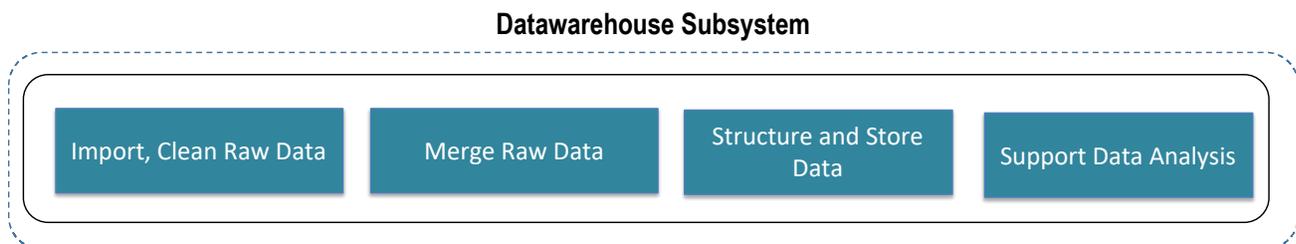
6.5.2. Detailed Functional Requirements

6.5.2.1. Subsystem: Datawarehouse, Component: Data Loader

► Functional Group 1 – Import RUC Data

► Function 1a: Importation of Raw Data

DL.IRD.1   An initial mass Importation of raw data from the Vehicle Registry shall take place for the date range defined in the Business Rules (BR.Part1.51) based on the VIN as the unique identifier for each row imported. This initial mass importation shall serve as baseline to identify initial valid odometer readings from the PMVI initial mass importation (c.f. DL.IRD.2). The fields of the data sets imported from the Vehicle Registry database are the following:

► Name – field description

► License # (plate number)

► VIN (Primary record identifier - BR.Part1.12)

► Registered Vehicle Owner First Name

- ► Registered Vehicle Owner Last Name

- ► Registered Vehicle Owner Address

- ► Make

- ► Model – body type

- ► Year

- ► Sft Exp – month and year of the safety check expiration

- ► Odometer – most recent odometer reading imported from PMVI.

- ► **Status –** vehicle status (A:Active and I:Inactive)

- ► Extended list of vehicle statuses:

- ► "A" **- Active -** A vehicle that is currently registered. These are retained indefinitely on the computer files.

- ► "I" **- Inactive -** A vehicle which has not been renewed for one calendar year. The system automatically changes the status from 'A' to 'I' at the end of the renewal period. The record is retained for 1 year before it is removed from the system

- ► "J" **- Junked -** A vehicle in which the owner surrenders the license plates and registration to MVR. MVR will change the license status code. The vehicle record will remain on the computer files for one year before it is removed.

- ► "P" **- Privatized** - Vehicle was added via a new car dealer and needs to be reviewed by MVR via a special transaction. Once review is completed, MVR will update the status to A with another special transaction. Records flagged with "P" otherwise can only be inquired, not updated.

- ► "R" **– Retired -** The vehicle's license is retired due to the replacement of plates for any reason. The vehicle data is recorded under the new license. The retired record is removed from the computer files after 1 year.

- ► "S"- **Stored -** A vehicle in which the owner surrenders the license plate and registration with the intention of storing the vehicle for a period of time. MVR changes the status code to indicate this transaction. The record is maintained on the computer files for 1 year before being removed.

- ► "T" - **Transferred -** The vehicle's plates have been transferred to another vehicle.

- ► "X", "V" and "W" - **Insurance Salvage variants -** owner retained; vehicle in storage; A vehicle's license plates, certificate of ownership and certificate of registration have been surrendered by an insurance company as an Insurance Salvage. Remains 1 year before being removed

- ► "M" **– Shipped -** A vehicle is shipped out of state. Remains one year before being removed.

DL.IRD.2   An initial mass Importation of raw data from the PMVI database for the date range defined in the Business Rules (BR.Part1.51) based on the combination of VIN, Inspection ID, Inspection Date timestamp, County Code as the unique row identifier for each row imported. The fields of the data sets imported from the PMVI database are the following:

- ► Name

- ► **VIN**   //scanned or manual entry (or previous record)

- ► License Plate Number // manual entry (or previous record)

- ► **Inspection Date** - *timestamp* // system generated
- ► **Inspection Station ID** // system generated
- ► **County Code** // system generated
- ► Vehicle Mileage - *odometer reading* // manual entry
- ► Vehicle Mileage Measurement – *unit*s //manual entry
- ► Inspection PASS/FAIL //manual application entry
- ► Vehicle Year // manual entry + VIN decoder (or previous record)
- ► Vehicle Make // manual entry + VIN decoder (or previous record)
- ► Vehicle Model // manual entry + VIN decoder (or previous record)
- ► Vehicle Type Code // manual entry
- ► Two Year Inspection Cert Issued – *Y/N* (twoyearinspectioncertissued) //manual application entry
- ► GVW – *in pounds* (gvw) //manual entry (or previous record)
- ► Reinspection Yes/No (reinspectionyn) //manual entry

DL.IRD.3   Periodic importation of raw data from the Vehicle Registry as defined in the Business Rules (BR.Part1.29). The time period for importing data from the Vehicle Registry should be configurable and can be scheduled to occur on a recurring basis for a given date range. The data import will be accomplished as a semi-automated process through flat files delivered through a secure File Transfer Protocol (SFTP).

DL.IRD.4   Periodic importation of raw data from PMVI as defined in the Business Rules (BR.Part1.29). The time period for importing data from the PMVI database should be configurable and can be scheduled to occur on a recurring basis for a given date range. The data import will be accomplished as a semi-automated process through flat files delivered through a secure File Transfer Protocol (SFTP).

DL.IRD.5   The importation of the PMVI and Vehicle Registry data shall be sequenced as described in the Business Rules (BR.Part1.29).

Function 1b: Clean Raw Data

DL.CRD.1   Original Raw data shall be archived as they may be reused for consistency checks and to reapply new business rules. Non-destructive data analysis shall be conducted, i.e. original formats shall be stored for future reference if further disambiguation is required. In particular, raw address data from DIT will need to be retained so it can be compared to each new import to determine possible change in vehicle ownership (compare name/address from old and new data).

DL.CRD.2   In order to avoid storing and processing low quality data into outputs for end users, a conservative approach shall be used to determine eligible vehicles and valid odometer readings that will be merged from the Vehicle Registry and PMVI data sources. Questionable data shall be filtered out (i.e., not used) as follows:

► incomplete or invalid data from the Vehicle Registry includes the following cases:

► missing registered owner

► missing or incomplete address (meaning: no street and/or city and/or zip)

► Invalid or non-deliverable address (per USPS NCOA database)

► Invalid VIN (cannot be decoded)

► incomplete or invalid data from the PMVI database includes the following cases:

► Invalid VIN (cannot be decoded)

► missing odometer reading,

► missing date of the odometer reading

► odometer readings that are outside the accepted date range specified in the Business Rules (BR.Part1.53)

► failed safety inspection

DL.CRD.3   Standardize vehicle address field:

► Address *number* formats

► Street prefix (e.g., N/S/E/W) and suffix

► Route type (e.g., Rd., St., Pkwy.)

► Note: Standardization will assist with identification of fleets, and will help ensure that no more than one Driving Report will be issued and mailed per owner/address combination for individual vehicle owners.

DL.CRD.4   Standardize date formats for odometer readings before storing the dates in the HiRUC system.

DL.CRD.5   Decode VIN - confirm all vehicle data fields that were manually entered (make, model, year, GVWR, vehicle type, propulsion type), and find values of average city/highway MPG, fuel/engine type[2].

DL.CRD.6   Record and report data quality percentages to HiRUC Administration, i.e. percentage questionable data records eliminated per category (c.f. DL.CRD.2) after the data cleansing process. For example:

► Percentage of records with missing vehicle registered owner

► Percentage of records with missing or incomplete address

► Percentage of invalid VINs

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[2] Subject to the data that is available from a VIN – e.g. year/make/model is "always" encoded in the VIN itself. However, other data (e.g. MPG) will need to be merged from other sources.

6.5.2.2. Subsystem: Datawarehouse, Component: Data Merger

► Functional Group 2 – Merge Data

► Function 2a: Merge Raw Data from PMVI and Vehicle Registry

DM.MRD.1   Merge data records based on VIN data:

► In order to be included, a VIN must be present in both databases (PMVI and Vehicle Registry) and should have an active or inactive status in the Vehicle Registry (Status = "A" or "I") - archive any data that does not include a VIN reference in both databases or does not have an active/inactive status in the Vehicle Registry. *Note that according to the status definitions in the Vehicle Registry, a vehicle with an Inactive status is a vehicle that has not been renewed for one calendar year. The system automatically changes the status from 'A' to 'I' at the end of the renewal period. The record is retained for 1 year before it is removed from the system. Records for inactive vehicles are considered as they may have corresponding (late) entries in the PMVI database.*

► Data should be merged on the basis of each VIN record in the Vehicle Registry, and each VIN and Inspection Date timestamp combination in the PMVI database. In case there should be multiple VIN records in the Vehicle Registry, the most recent record for an active vehicle should be taken to merge the data. After the data merge, there may be as many rows for a VIN as there are Inspection Date timestamps.

DM.MRD.2   Merged data that does not meet criteria defined in DM.MRD.1 shall be archived as they may be reused for consistency checks and to reapply new business rules.

DL.MRD.3   Record data merging steps and report percentage of records eliminated per category after the data merging process to HiRUC Administration. For example:

► Percentage of records without matching VINs in both data sources

► Percentage of records without valid odometer readings

► Percentage of records without VINs with "Active" or Inactive" status

6.5.2.3. Subsystem: Datawarehouse, Component: Master Database

► Functional Group 3 – Structure and Store Data, Determine Eligibility

► Function 3a: Structure and Store Data

MD.SD.1   Store data in a relational database. The database structure should allow to issue Driving Reports per vehicle and track Driving Report status for each vehicle.

MD.SD.2   The data warehouse shall maintain a record of "prior" (BR.Part1.5) and "current" (BR.Part1.6) mailing address for each odometer and VIN, with date stamp for each (date of last verified address in the Vehicle Registry). For the first few months of the pilot, the database will be initialized with the value (address) in the initial mass data importation (c.f. DL.IRD.1) from the Vehicle Registry with the assumption that the odometer reading initially imported from PMVI (c.f. DL.IRD.2) was taken at the address of the initial importation.

MD.SD.3   The data warehouse shall maintain a record of "prior" (BR.Part1.7) and "current" (BR.Part1.8) owner name for each VIN, with a date stamp for each based on the month when the owner name and VIN combination last appeared in the Vehicle Registry.

MD.SD.4   The data warehouse shall maintain a record of "prior" (BR.Part1.9) and "current" (BR.Part1.10) odometer readings from PMVI inspections, with two date/timestamps: a date/timestamp of the inspection date, and a date/timestamp of when the odometer reading was updated in the data warehouse. Data should only be updated if a new file import has different data from what is stored.

► Function 3b: Identify vehicles eligible to receive Driving Reports (filter out ineligible vehicles, edge cases, anomalies, and exceptions)

MD.IEV.1   The system shall determine initial vehicle eligibility to receive Driving Reports and then continually update eligibility during the course of the pilot. The frequency of eligibility updates shall occur at the same frequency as the periodic data imports (c.f. DL.IRD.3, DL.IRD.4), (BR.Part1.30).

MD.IEV.2   The system shall store the vehicle's current applicable eligibility to receive Driving Reports, as defined in the requirements below. Note that eligibility rules may change during the course of the pilot as they are configurable (e.g. status in Vehicle Registry, eligible vehicle types, minimum and maximum number of months between odometer readings).

MD.IEV.3   Only vehicles that have the following **minimal set of data** are eligible for Driving Reports:

► Registered owner's name
► Registered owner's address
► VIN
► Miles driven over <<period>>
► <<Period>> (e.g., start/end month, quarter, year)
► Start odometer used
► End odometer used
► Vehicle's EPA-estimated city/highway fuel economy

MD.IEV.4   Vehicles have to comply with the following **basic eligibility rules**:

► **Vehicle types:** only vehicles types that are authorized are eligible. Authorized vehicles and excluded vehicle types are listed in the Business Rules (BR.Part1.16).

► **Vehicle fuel types:** certain vehicle types are excluded as described in Business Rules (BR.Part1.17):

► **Vehicle status:** Driving Reports can be generated only for vehicles that have an active status, i.e. vehicle status code = 'A' at the time of the Driving Report generation (BR.Part1.19)

- ► **Vehicle Part 2 enrollment**: vehicles that are enrolled in Part 2 are not eligible to receive a Part 1 Driving Report (BR.Part1.18)
- ► Part 1 Driving Report already issued for owner/vehicle combination (BR.Part1.46)
- ► **Registered owner address:** Only vehicles that have a registered address in Hawaii are eligible (BR.Part1.24)

MD.IEV.5   Vehicles have to comply with odometer readings **eligibility rule**:

- ► Only vehicles that have at least 2 valid PASS odometer readings, at least "x" months apart (BR.Part1.27a), and no more than "y" months apart BR.Part1.27b), on consecutive years. The values of "x" and "y" shall be configurable, and can be set to values specified in the Business Rules when the system is initialized. Note the following for two odometer readings to be considered valid:
- ► Each odometer readings must be issued from a successful inspection, i.e. a PASS result (BR.Part1.9, BR.Part1.10, BR.Part1.26)
- ► Each odometer reading must be a non-negative value
- ► The two odometer readings must change from one date to another at a reasonable rate, i.e. a change of not less than zero miles, and not more than +1,500 miles, per day.

MD.IEV.6   Changes in vehicle data between two eligible odometer readings, should comply with the following **change** eligibility **rules**:

- ► **Registered owner address:** if the owner remains the same, and the address changes within the **same county**, the vehicle is eligible to receive a Driving Report (BR.Part1.21)
- ► **Registered owner (vehicle ownership):** If the registered owner changes, but the address remains the same, the vehicle is ineligible to receive a Driving Report (BR.Part1.22)

MD.IEV.7   Identify (and flag) records edge cases (valid cases that are not addressed in the HiRUC Demonstration):

- ► Cases where vehicles have not changed ownership, but the registered owner changed registration county between most recent valid annual odometer readings
- ► Cases where vehicles have changed ownership between most recent valid annual odometer readings
- ► Cases where odometer readings are in kilometers instead of miles (BR.Part1.49)

MD.IEV.8   Identify (and flag) records for anomalies:

- ► Anomalies where calculated miles (difference between odometer readings) are out of normal ranges, i.e. recorded negative mileage, or recorded mileage of greater than 1500 miles per day, shall be considered unreasonable and the mileage record marked for investigation.
- ► Individual vehicles that exceed the maximum number of miles driven (BR.Part1.47)
- ► Individual vehicles that exceed the maximum RUC driven (BR.Part1.48)

MD.IEV.9   Identify (and flag) records for exceptions (valid cases that are exempted from HiRUC Demonstration):

► Exceptional cases where vehicles are linked to addresses that are on the HiRUC DON'T-SEND list (BR.Part1.20)

► Vehicles identified as operating on out-of-state permits at the time both "prior" and "current" odometer readings are recorded (BR.Part1.25).

MD.IEV.10   Report percentage of records eliminated in each Driving Report eligibility determination category (c.f. categories mentioned from MD.IEV.3 to MD.IEV.9 to HiRUC Administration. For example:

► Percentage breakdown of ineligible cases (e.g. ineligible odometer reading, change of county, enrolled in Part 2, etc.)

► Percentage breakdown of edge cases (e.g. "kilometers instead of miles", "change of ownership", etc.)

► Percentage breakdown of anomalies (e.g. unreasonable mileage, high RUC, etc.)

► Percentage breakdown of exceptions (e.g. "Don't send list", out-of-state permits)

► Function 3c: Identify Vehicle Segments

MD.IVS.1   Identify fleet owners according to (1) pre-identified fleets that have provided the list of their vehicles to the HiRUC Administration (type 1), (2) vehicles registered to the same name and address, i.e. vehicles that can be linked back to the same address (type 2), and (3) pre-identified by inspection stations (type 3). [BR.Part1.4].

MD.IVS.2   The data warehouse shall maintain a record of vehicles identified as part of a "fleet", including which vehicles are associated with a given fleet, and the fleet's name, address, and type (optional)[3]. Types of fleets include: private company; city government; county government; state government; other (BR.Part1.26).

MD.IVS.3   Identify individual electric vehicle (EV) based on decoded vehicle propulsion types. Note that this segment includes EVs and PHEVs (Plug-in Hybrids) [BR.Part1.1, BR.Part1.2].

MD.IVS.4   Identify individual non-electric vehicles based on decoded vehicle propulsion types. [BR.Part1.2, BR.Part1.3].

MD.IVS.5   The system shall record the segments identified for each VIN and shall allow the HiRUC Administration to query vehicles based on the vehicle segment.

► Function 3d: Build Complete Data Set for Driving Report

MD.BCD.1   The system shall build a complete set of data for each VIN. This set of data shall include all the valid data elements needed to generate the Driving Report layout that corresponds to the vehicle segment.

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[3] There is no mechanism to determine the "type" of the fleet except, perhaps, for pre-identified fleets. A data field can be provided in the system, but there is no guarantee that it will be populated.

MD.BCD.2 The applicable RUC and gas tax county rates for individual VINs and fleets belong to a fleet depend on the registration address of the vehicle (BR.Part1.11a) or vehicle fleet (BR.Part1.11b). County rates are only applicable for counties that have opted in to participate in the HiRUC Demonstration (BR.Part1.40).

MD.BSD.3 The system shall generate a unique, pseudorandom 5-digit alphanumeric ID for each driving report.

MD.BSD.4 The system shall be able to flag Driving Reports that will be accompanied by a paper survey (identified by Driving Report number) and a pre-paid envelope depending on criteria established by the HiRUC Administration (e.g. zip code).

► Functional Group 4 – Support Monitoring and Data Analysis
► Function 4a: Track and Integrate Status of Driving Reports Issued

MD.DRS.1 The system shall track progress on Driving Report generation for each VIN and integrate progress updates from the DRG subsystem, the Printing and Mailing system, and list of mail returns (BR.Part1.43). The system shall maintain the current status of Driving Reports for each VIN. The Master database shall maintain the following Driving Report statuses and the timestamps of the status updates:

► From the Master database processing system
► **Incomplete** (awaiting second valid odometer reading for vehicle)
► **Ineligible** to receive Driving Report (vehicle is ineligible and odometer availability shall not be considered)
► **Pending** (vehicle is eligible and second odometer reading has been received, but other business rules need to be run according to the vehicle segmentation)
► **Complete** (all the valid data elements are available to generate the Driving Report layout that corresponds to the vehicle segment)
► From the DRG subsystem
► **Generated** (Driving Report generated for review, but has not yet been approved)
► **Rejected** (Driving Report was generated but was not approved. The report has to be potentially regenerated)
► **Approved** (Driving Report approved, but not retrieved and printed by the Printing and Mailing system)
► From the Printing and Mailing system
► **Sent** (Driving Report mailed by the Printing and Mailing system)
► From the manual return detection process (BR.Part1.43)
► **Returned** (Driving Report sent by Printing and Mailing system, but received in return address)
► Function 4b: Report Data to HiRUC Administration

MD.RD.1 Submit Data reports to the HiRUC Administration who verifies data has been accurately collected, processed into road usage data and displayed on Driving Reports.

MD.RD.2 Submit Data reports for all eligible vehicles for which Driving Reports have been **approved** and **sent.** The data reports should include vehicle segment information and all data elements displayed on the Driving Report.

MD.RD.3 Report Driving Report Status (c.f. MD.DRS.1) for each eligible vehicle.

► Function 4c: Data Querying

MD.DQ.1 Reports should be built on a relational database that consolidates all Driving Report data, i.e. all the data elements used for Driving Reports including vehicle data, mileage reports, reporting period, mileage consumption, fuel tax credit, RUC charge. The relational database should have flexibility to accommodate report requests of the HiRUC Administration.

MD.DQ.2 Enable intermediate data analysis to meet the monitoring and administrative needs of HiRUC Administration, and to allow HiRUC Administration to refine Driving Report segmentation concepts and business rules during the Demonstration.

7. Driving Report Generator Subsystem Requirements

7.1. Subsystem Context

► This section presents an overview of the Driving Report Generator (DRG) subsystem. The DRG subsystem supports Driving Report generation throughout the HiRUC Demonstration. It generates Driving Reports for Part 1 and Road Usage Reports for Part 2. In Part 1, the DRG builds Driving Reports that are printed out by an external printing and mailing system and sent by mail to registered vehicle owners.

7.2. Subsystem Purpose

The purpose of the subsystem is to generate, store and transmit (to an external printing and mailing system) Driving Reports for eligible registered passenger vehicles.

► The objectives of the DRG subsystem are to:

► Apply Driving Report Business Rules to RUC Data: Import processed RUC data from the Master Database component of the Datawarehouse and apply rules according to the segment to which the vehicle and the vehicle owner belong

► Build Driving Reports according to the predefined layout for the vehicle/vehicle owner segment

► Store Driving Reports and make them accessible to an external printing and mailing system

► Report on the status of Driving Reports issued to the HiRUC Administration

7.3. Subsystem Overview

This section presents an overview of the DRG subsystem, which includes four components:

► **Data processing component** that identifies the segment to which the vehicles belong and applies the relevant Driving Report business rules to the Driving Report data

► **Building component** that builds Driving Reports in PDF format according to the layout of the segment identified

► **Repository component** that stores the PDF Driving Reports that are accessed by the external printing and mailing system

► **Reporting component** that sends status updates Driving Reports that have been generated to the HiRUC Administration.

7.4. Subsystem Requirements

### 7.4.1. Subsystem Security

The system requirements that cover protection of personal identifiable information (PII), security, backup and recovery shall also cover specific details for this subsystem

7.5.   Driving Report Generator Subsystem Specifications

7.5.1.   Subsystem Functional Groups

Figure 7 shows the breakdown of these activities into functions. The requirements underlying those functions are described in detail in the following section.

Figure 7: Functions Supported by the DRG Subsystem

Driving Report Generator Subsystem

Prepare Data for Driving Reports	Generate and Store Driving Reports

Support Data Analysis
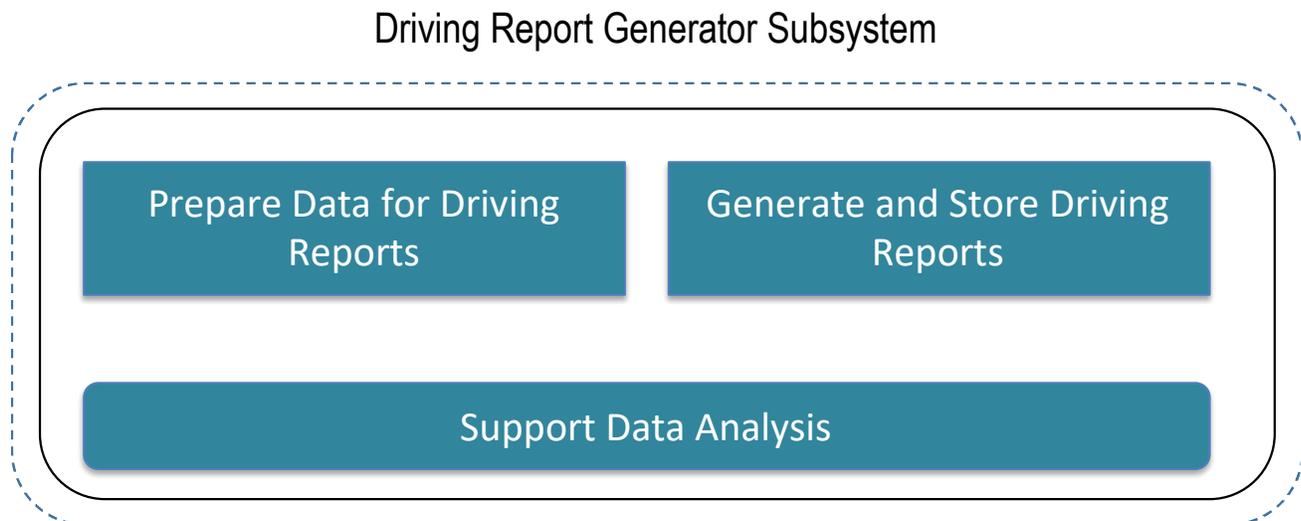
7.5.2.   Detailed Functional Requirements

► Functional Group 1 – Prepare Data for Driving Reports

► Function 1a: Compute RUC Data

DRG.CRD.1   Compute miles traveled between two most recent valid annual odometer readings (odometer range) and check for inconsistencies.

DRG.CRD.2   Compute the RUC charge due by multiplying the State RUC rate plus the County RUC rate times the miles traveled (Odometer range x RUC rate) – the County is identified using the County of registration of the vehicle (i.e. the registration address that is in the DIT database).

DRG.CRD.3   Identify the date range for which the road usage charge applies (date of first valid odometer reading to date of last valid odometer reading used).

DRG.CRD.4   Compute fuel consumed by multiplying average city/highway MPG times miles traveled.

DRG.CRD.5   Apply rate to fuel consumed (Fuel consumed x (State fuel tax rate + county fuel tax rate).

DRG.CRD.6   Clearly identify eligible VINs and corresponding RUC rates and fuel tax rates that will be included on Driving Reports.

► Functional Group 2 – Generate and Store Driving Reports

► Function 2a: Generate Driving Reports

DRG.GDR.1   Generate Driving Reports for VINs according to Driving Report segments established for Electric Vehicles, Non-Electric vehicles, Fleets (c.f. Business Rules).

DRG.GDR.2   Generate the data required to print each Driving Report (e.g. PDF or DR data file, depending on printer requirements).

► Function 2b: Store Driving Reports

DRG.SDR.1   Makes the DR data files accessible to external printing and mailing system – the interface between the DRG subsystem and the printing and mailing system is detailed in the ICD.

► Functional Group 3 – Support Data Analysis

► Function 3a: Track and Update Status of Driving Reports

DRG.SDA.1   Update status of Driving Reports.

► **Generated** (Driving Report generated for review, but has not yet been approved)

► **Rejected** (Driving Report was generated but was not approved. The report has to be potentially regenerated)

► **Approved** (Driving Report approved, but not yet retrieved by the Printing and Mailing system)

► **Sent** (Approved Driving Report sent to the Printing and Mailing system)

► Function 3b: Report Status Data to the Master Database component

DRG.RSD.1   Report Status of Driving Report.